

Unit 13

Day 4

Inverse of a Function

QUICK QUIZ:

Name_____

Date_____

$$f(x) = \frac{1}{x-6} \quad g(x) = \frac{8}{3x}$$

Find:

1) $f + g$

2) $\frac{f}{g}$

3) $f \circ g$

To find the inverse, switch the roles of x & y

Ex1: $P = \{(2,4)(1,1)(-3,9)(0,0)(-5,25)\}$

Inverse: $P^{-1} = \{(4,2), (1,1), (9,-3), (0,0), (25,-5)\}$

Domain of Inverse: $D: \{4, 1, 9, 0, 25\}$

Range of Inverse: $R: \{2, 1, -3, 0, -5\}$

The inverse of $f(x)$ is denoted by $f^{-1}(x)$. State the domain and range of each. The domain of $f(x)$ is the range of $f^{-1}(x)$ and vice versa.

Find $f^{-1}(x)$.

$$f(x) = 3x + 2$$

$$D = (-\infty, \infty)$$

$$R = (-\infty, \infty)$$

$$x = 3y + 2$$

$$x - 2 = 3y$$

$$y = \frac{x - 2}{3}$$

$$f^{-1}(x) = \frac{x - 2}{3}$$

$$f(x) = x^3 - 5$$

$$D: R: = \mathbb{R}$$

$$x = y^3 - 5$$

$$x + 5 = y^3$$

$$\sqrt[3]{x + 5} = y$$

$$f^{-1}(x) = \sqrt[3]{x + 5}$$

$$D = (-5, \infty) \quad R: \mathbb{R}$$

$$f(x) = \sqrt{x + 3}, \quad x \geq -3$$

$$D: [-3, \infty) \quad R = [0, \infty)$$

$$x = \sqrt{y + 3}$$

$$x^2 = y + 3$$

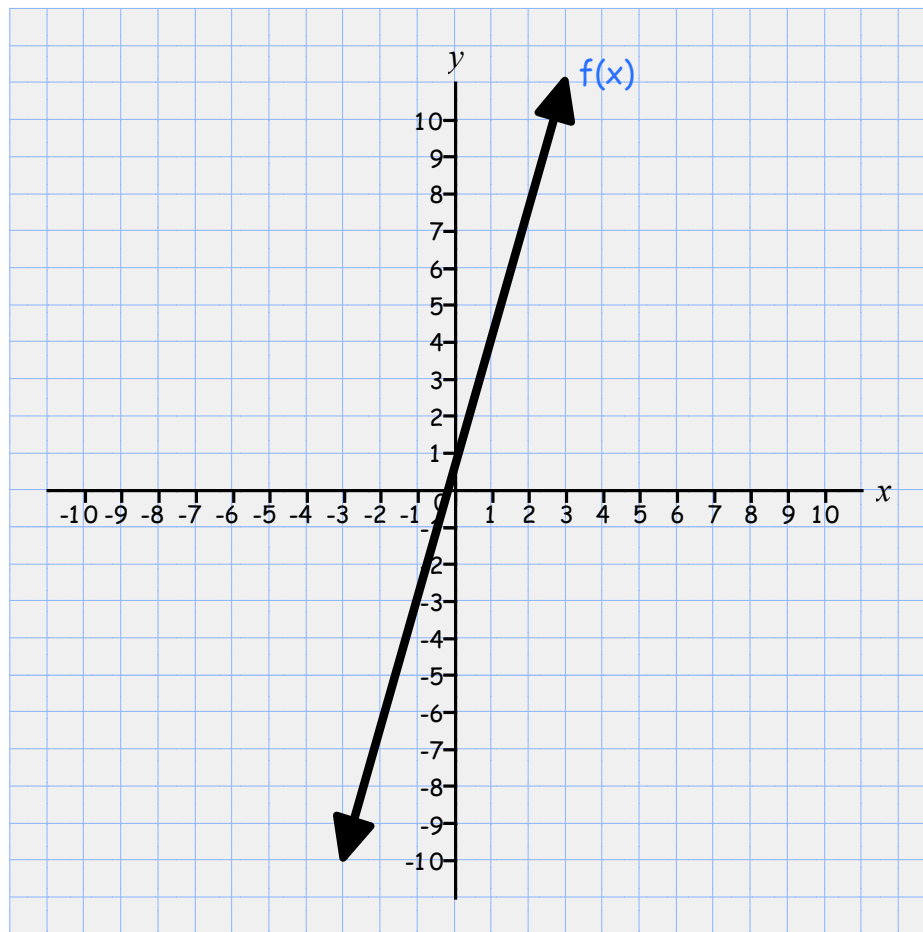
$$y = x^2 - 3$$

$$f^{-1}(x) = x^2 - 3$$

$$D: [0, \infty)$$

$$R: [-3, \infty)$$

Graph the inverse of $f(x)$



f^{-1} is a function if and only if (iff) f is one-to-one

How to determine if a function is one-to-one.

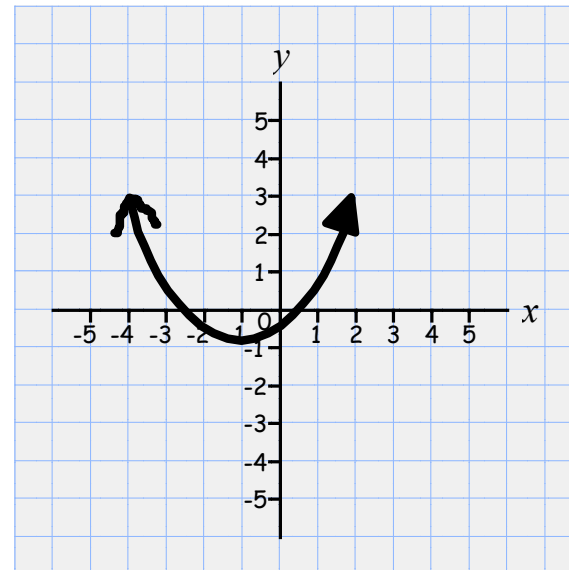
- * If the function is a set of points, the points may **not** have repeated **x or y values**.
- * If the function is an equation, solve for x and if \pm results then the function is not one-to-one.
- * If the function is graphed, use horizontal line test.

Are the functions one-to-one?

Ex2: $m=\{(3,7)(-2,4)(1,-3)(-6,8)(0,5)(9,-2)\}$

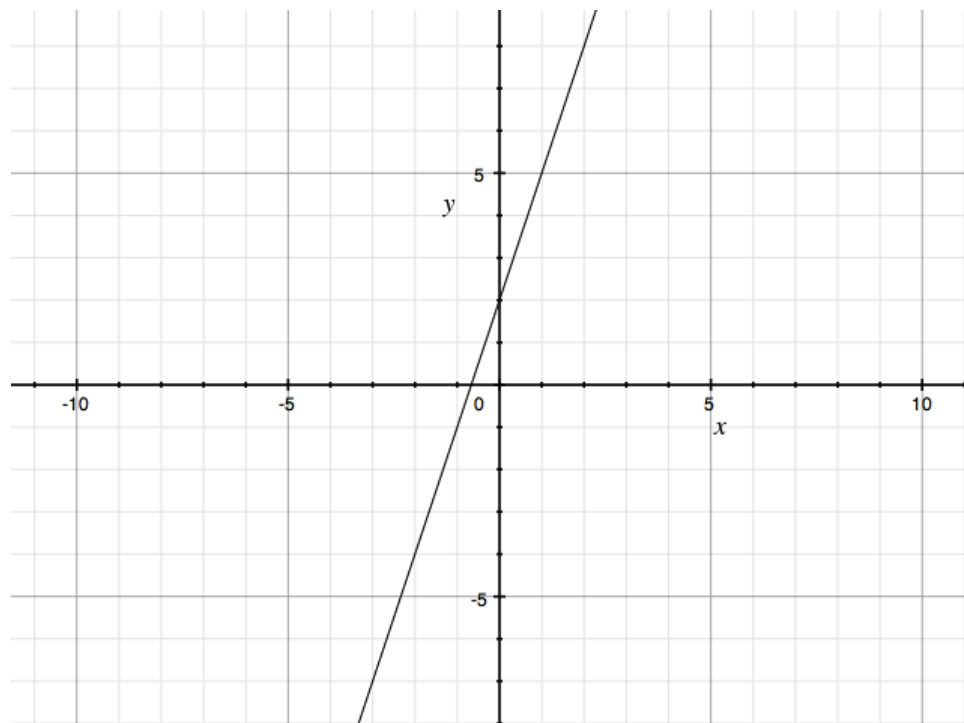
Ex3: $y = \sqrt{5 - x^2}$

Ex4:



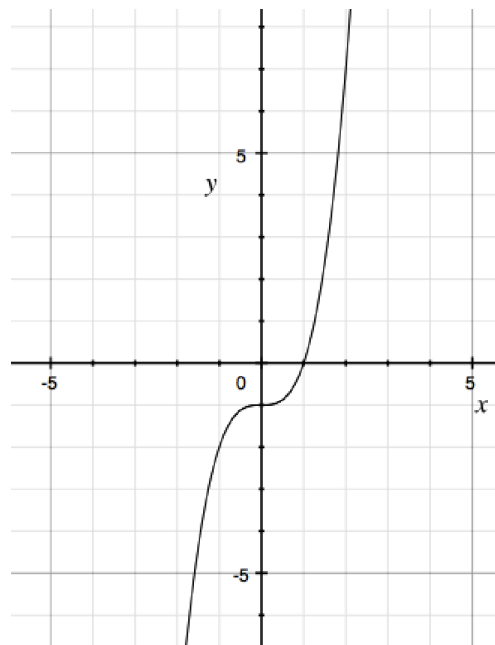
For the function, determine if it is one-to-one. If so, write an equation for the inverse. State the domain and range of the function and its inverse. Graph both.

$$y = 3x + 2$$



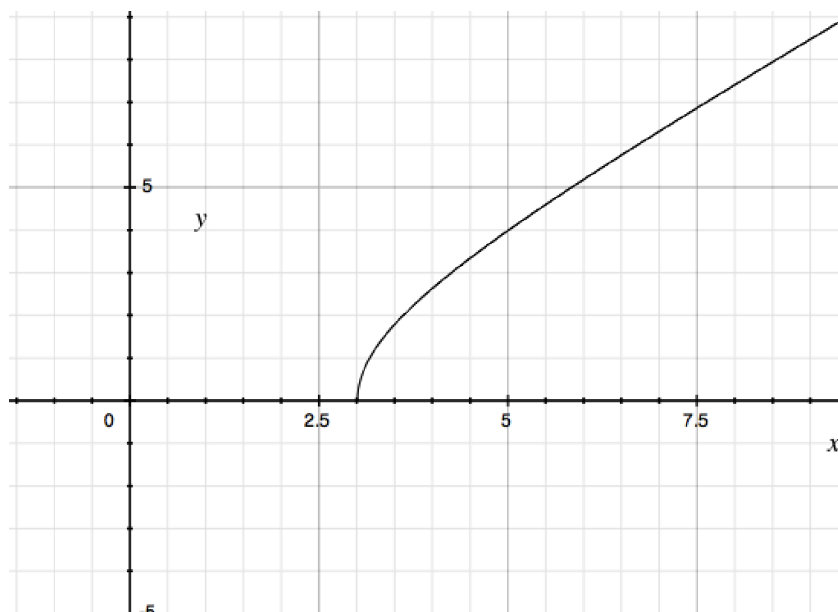
For the function, determine if it is one-to-one. If so, write an equation for the inverse. State the domain and range of the function and its inverse. Graph both.

$$y = x^3 - 1$$



For the function, determine if it is one-to-one. If so, write an equation for the inverse. State the domain and range of the function and its inverse. Graph both.

$$y = \sqrt{x^2 - 9}$$



HOMEWORK:

UNIT 13 DAY 4

p 355-7: 13-26, 61-70